Brief History of CDF

- Evolved from 1977 Snowmass workshop
- Design Report 1981

- 1985 run with partial detector (no Drift chamber)
  - Several weeks of attempt
  - One store of collisions

- Engineering run: 1987 (~6 months)
  - entire detector complete
  - 20 W's, 1 Z (lepton+track)

- Run 0: 1988-89 (4 pb^{-1}) first publications
  - 1988: momentum distributions of charged particles
  - 1989: Z mass, x-sections(W, Z, jets, K_s), SUSY limit
  - 1990: W mass (400 MeV)
  - 1991: Top mass limit

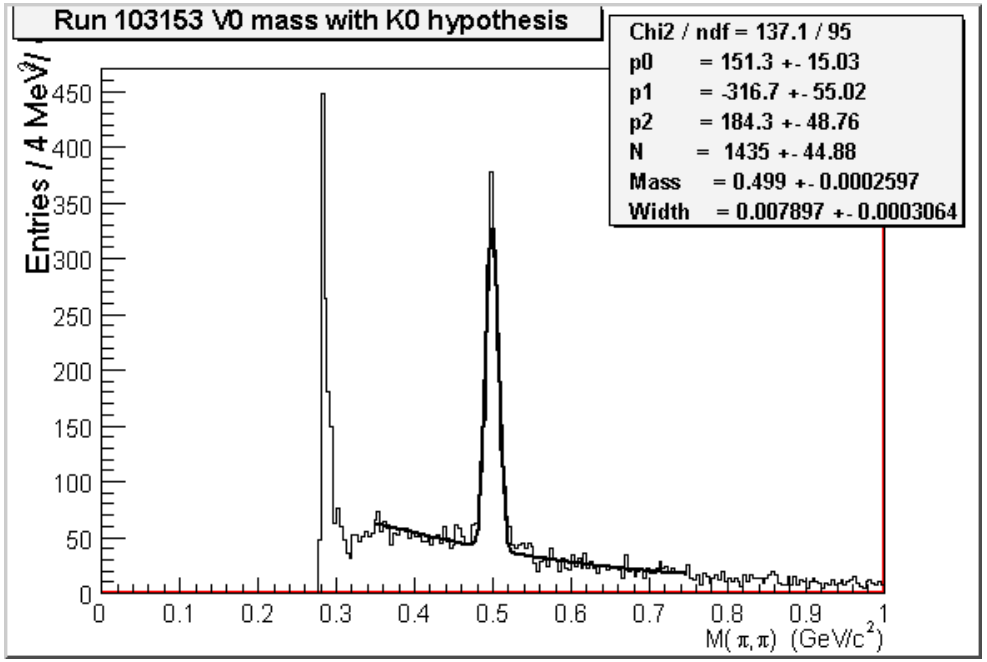
Brief History of CDF

- Run 1a: 1992-3 (~20 pb^{-1}), Run Ib: 1994-5 (~90 pb^{-1})
  - First Silicon detectors (SVX, SVX') in hadron collider.
  - Top quark story
    - April 1994 Top Evidence with M_{top} = 174 ± 16 GeV
    - February 1995 Top Discovery
    - Mass: δM_{top} 6.6 GeV mass uncertainty (2001)
  - W mass: δM_W = 180 MeV (1995), 79 MeV (2001)
  - 2σ sin(2β) measurement (2000), B_c discovery (1998)
  - E_T Jet cross section up to ~450 GeV (1996)
  - Pushed up new physics limits

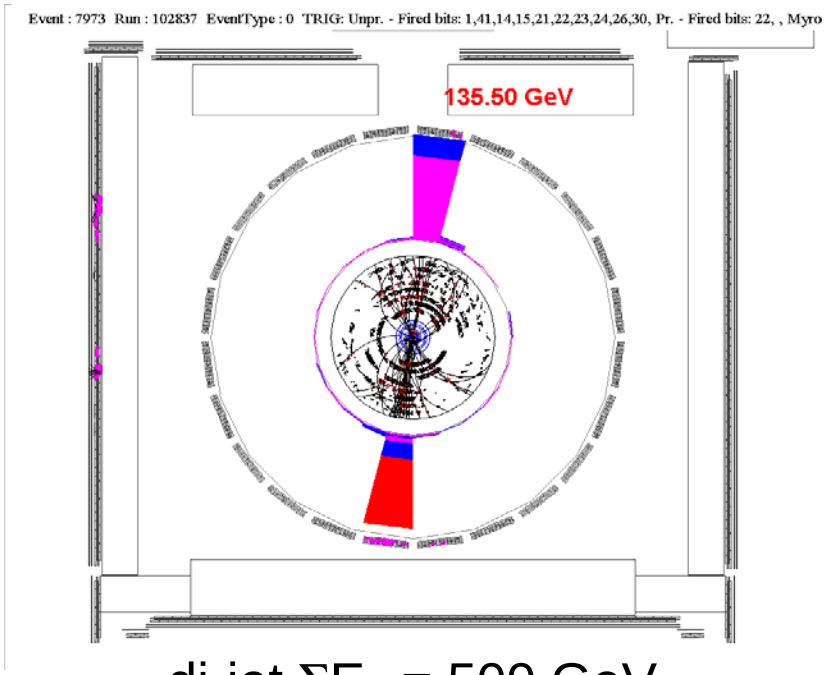
- Run II
  - Engineering run (~6 weeks): Oct. 2000
  - Roll-in: January 2001
  - Commissioning with data: April 2001 - January 2002
  - Physics run: February 2002 -
    - δM_{top} = ~8 GeV(2004), **< 4 GeV(2005) - 2% meas.**
    - Jet energy calibration - similar to Jerry's presentation

Run II Experience: Engineering Run

- Late September - October 2000



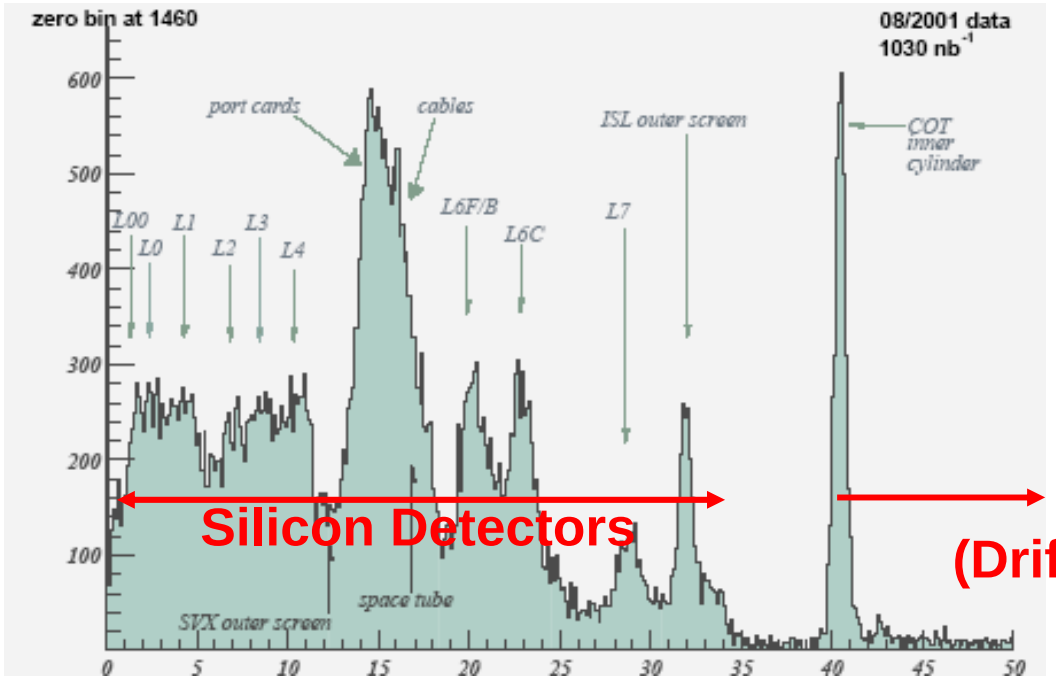
K_s peak M($\pi\pi$)



di-jet ΣE_T = 500 GeV

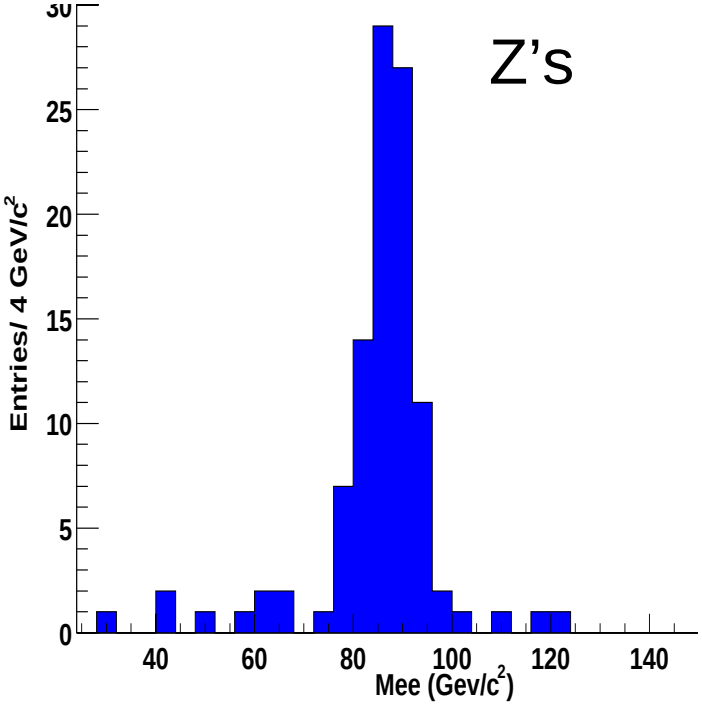
Run II Experience: Commissioning with Data

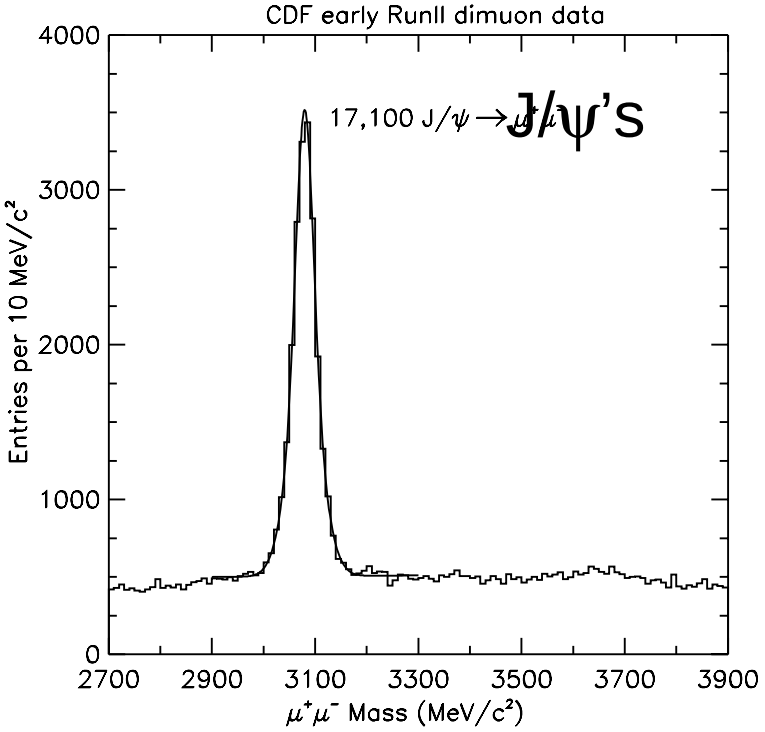
- Roll-in: January 2001
- First collision: April-May 2001
- Calibrating material (August 2001)
  - 1 pb^{-1} with photon conversions



Run II Experience: Commissioning with Data

- Calibrating EM cal. energy (January 2002 with < 10 pb^{-1})
  - 10 pb^{-1} Z's
    - CEM E scale established to be ~1%
    - PEM E scale established to be ~7%





Run II Experience: First Publications

- First Paper
  - D_s^+ and D^+ mass difference
  - Submitted March 2003 - two years after we rolled in (January 2001)

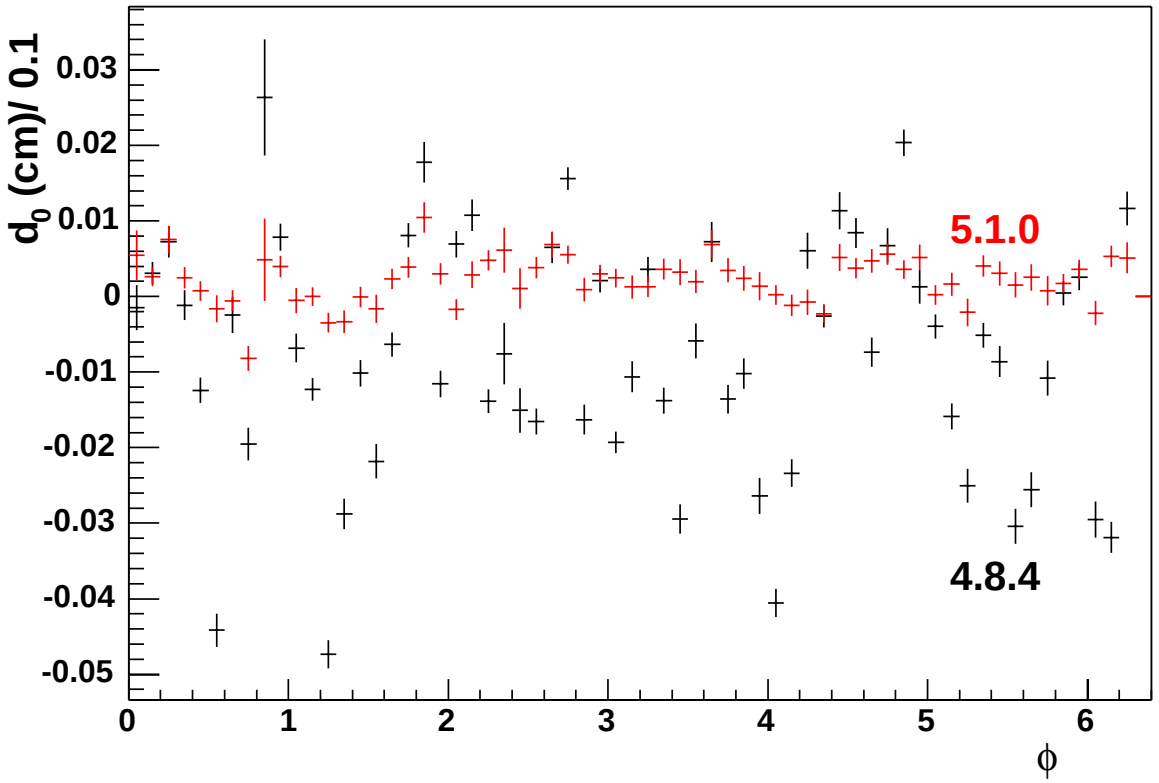
- First Top paper
  - Top pair cross section in dilepton
  - Submitted April 2004 - three years after we rolled in

- First limit paper
  - $H^{++/--}$ in dilepton, Submitted June 2004

- First paper with jets and missing energy involved
  - Single top search, Submitted October 2004

- First Electroweak precision measurement
  - $M_{top} = 173.5\ ^{+3.9}_{-3.8}$ GeV, will be submitted August/September 2005

Run II Experience: COT Alignment with Cosmics



Run II Experience

- COT
  - turned on quickly and smoothly (later hick-up due to aging)
- Silicon
  - We were rushed with silicon.
    - Detectors in the collision hall, Took long to commission
  - Beam incidents
- Plug calorimeter
  - Experienced aging much too early
- Triggers and DAQ
  - Took a long time to bring up the trigger
  - Numerous effort to fix DAQ
- Offline
  - Painful
  - Struggling with C++
  - Complicated structure that the collaboration was not used to
  - Processing data, calibration, …

Comments to LHC Experiments

- Implementing Triggers - extremely important
  - Trigger meeting - the most popular meeting in Run I
  - Heart of everything!
    - From Commissioning to Physics
    - Physics priority
    - Systematic way of turning on triggers - fast feedback
  - Needs a good mechanism
    - Open discussion with strong leaders
    - Well documented
  - Good trigger simulation!

- First physics results before easy discoveries like Z' will provide confidence
  - Cross-section measurements of known resonances
    - vector bosons, J/ψ, …
  - These measurements require ingredients necessary for discoveries!
    - Luminosity measurement
    - Good trigger/detector simulation (Efficiencies, Acceptance)